Application Number **10/800,390**
Amendment dated **24 March 2006**
Reply to Office Action of **24 January 2006**

Remarks

Applicants have neither added nor cancelled any claims in this response. Applicants have amended Claims 29 and 30 so that these claims no longer depend from previously cancelled Claim 28. Therefore, Claims 1–27, 29–36 and 64–77 remain pending in this application. Claims 31–36 and 64–77 have been withdrawn from consideration.

Claim Rejections Under 35 U.S.C. § 102(b).

Claims 1–6, 9–13, 15–20, 25–27 and 29 stand rejected under 35 U.S.C. § 102(b) as being anticipated by European Patent Application Publication EP 0 858 101 A2 ("Aoyama").

In the Office Action, the Examiner has characterized Aoyama as teaching:

> cooling the single crystal Si structure 1 from 650°C to 600°C or less, for example 550°C (col. 7, lines 23–25); then forming the SiGe epitaxial layer 4 at a temperature 600°C or less (col. 7, lines 26–29) by contacting the single crystal Si structure with a surface active compound Si/Ge (col. 7, lines 29–33).

In contrast to the teachings of Aoyama, Claim 1 recites, among other things:

> cooling the single crystal Si structure to a second temperature during a cooling time period;
>
> contacting the single crystal Si structure with a surface active compound **during at least a portion of the cooling time period**, the surface active compound being selected from the group consisting of a silicon compound and a germanium compound [emphasis added]

At the outset, Applicants draw the Examiner's attention to the fact that Claim 1 recites that contacting occurs **while** the single crystal silicon structure is cooling. Therefore, a reference that simply teaches contacting **after** cooling, when the structure is already at the lower temperature, cannot anticipate Claim 1.

Applicants respectfully submit that Aoyama fails to disclose or suggest the recitations of Claim 1. As the Examiner points out, Aoyama teaches "cooling the single crystal Si structure 1 from 650°C to 600°C or less, for example 550°C". Aoyama then teaches "forming the SiGe epitaxial layer 4 at a temperature 600°C or less by contacting the single crystal Si structure with a surface active compound". Even assuming that the Examiner has accurately characterized Aoyama as teaching a "cooling" process and a

"contacting" process, the Examiner points to no teaching or suggestion in Aoyama of "contacting the single crystal Si structure with a surface active compound **during at least a portion of the cooling time period**", as is recited in Claim 1 (emphasis added). More specifically, even assuming that Aoyama discloses the cooling process and the contacting process, **Aoyama provides no disclosure of the temporal relationship between these two processes**. Rather, the cited portions of Aoyama would only have taught cooling to a stable temperature follow by deposition at that cooler temperature, not during the cool down. This is in stark contrast to the recitations of Claim 1, which clearly define a temporal relationship between "contacting" and "cooling".

In support of this position, Applicants have submitted herewith a Declaration of Dr. Matthias Bauer Under 37 C.F.R. § 1.132 (hereinafter referred to as the "Rule 132 Declaration"). Applicants draw the Examiner's attention to Paragraph 6 of the Rule 132 Declaration, which indicates that a person of skill in the art of epitaxial deposition would not have considered Aoyama to teach or suggest contacting a single crystal silicon structure with a surface active compound during a period in which the structure is being cooled.

Based on the foregoing, Applicants submit that Aoyama does not disclose all of the elements recited in Claim 1, and therefore does not anticipate that claim. Therefore, Applicants respectfully request that this rejection be withdrawn. Furthermore, because Claims 2–6, 9–13, 15–20, 25–27 and 29 depend from independent Claim 1, and recite additional distinguishing features, Applicants submit that Claims 2–6, 9–13, 15–20, 25–27 and 29 are allowable for at least the same reasons that independent Claim 1 is allowable, and respectfully request that these rejections be withdrawn as well.

Claim Rejections Under 35 U.S.C. § 102(e).

Claims 1–6, 9–13, 15–20, 25–27 and 29 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent 6,875,279 ("Chu").

In the Office Action, the Examiner has characterized Chu as teaching:

> forming the silicon layer 85 at a temperatures between 700–950°C (col. 7, lines 55–58); cooling the temperature to 650°C (col. 6, line 63 through col. 7, line 1 or col. 7, lines 66–67); initiate silane follow then forming a low temperature epitaxial SiGe layer 86 at this cooling temperature (col. 8, lines 1–5) by contacting the

> single crystal Si structure with a surface active compound Si/Ge (col. 3, lines 59–63; col. 6, line 63 through col. 7, line 1 & col. 8, lines 4–5).

In contrast to the teachings of Aoyama, Claim 1 recites, among other things:

> cooling the single crystal Si structure to a second temperature during a cooling time period;
>
> contacting the single crystal Si structure with a surface active compound **during at least a portion of the cooling time period**, the surface active compound being selected from the group consisting of a silicon compound and a germanium compound [emphasis added]

At the outset, Applicants draw the Examiner's attention to the fact that Claim 1 recites that contacting occurs **while** the single crystal silicon structure is cooling. Therefore, a reference that simply teaches cooling followed by contact with a surface active compound at the cooled temperature cannot anticipate Claim 1.

Applicants respectfully submit that Chu fails to disclose or suggest the recitations of Claim 1. As the Examiner points out, Chu discloses "forming the silicon layer", then "cooling the temperature to 650°C", and "**initiate** silane flow". The Examiner has characterized Chu as forming a low temperature epitaxial SiGe layer "at this cooling temperature" by contacting with a surface active compound. Applicants point out that even if this characterization is accurate, Chu cannot anticipate Claim 1 because it does not teach or suggest contacting with a surface active compound **while** the single crystal silicon structure is being cooled.

Chu also discloses that a cryogenic pump is used to rapidly cool the reactor chamber to a low temperature epitaxy growth temperature (see Chu at 7:64–67). Significantly, Chu first discloses that the gate valve to the cryogenic pump should be closed, and then discloses that the silane flow is **initiated** to grow a low temperature silicon, germanium and/or silicon germanium epitaxial layer (see Chu at 8:1–8:5). The fact that Chu uses the word "**initiate**" to describe the silane flow after the cryogenic pump is deactivated clearly teaches away from any suggestion of "contacting the single crystal Si structure with a surface active compound during at least a portion of the cooling time period", that is, while the structure is being cooled, as is recited in Claim 1.

Applicants also draw the Examiner's attention to Paragraphs 8 and 9 of the Rule 132 Declaration, which indicates that a person of skill in the art of epitaxial deposition would not have considered Chu to teach or suggest contacting a single crystal silicon

structure with a surface active compound during a period in which the structure is being cooled.

Based on the foregoing, Applicants submit that Chu does not disclose all of the elements recited in Claim 1, and therefore does not anticipate that claim. Therefore, Applicants respectfully request that this rejection be withdrawn. Furthermore, because Claims 2–6, 9–13, 15–20, 25–27 and 29 depend from independent Claim 1, and recite additional distinguishing features, Applicants submit that Claims 2–6, 9–13, 15–20, 25–27 and 29 are allowable for at least the same reasons that independent Claim 1 is allowable, and respectfully request that these rejections be withdrawn as well.

Claim Rejections Under 35 U.S.C. § 103(a) based on Aoyama.

Claims 7, 8, 14, 21–24 and 30 stand rejected as unpatentable over Aoyama. To establish a *prima facie* case of obviousness, all the claim elements must be taught or suggested by the prior art (see MPEP 2143.03). Applicants respectfully submit that the Examiner has failed to meet this burden because, for example, Aoyama does not disclose "contacting the single crystal Si structure with a surface active compound **during** at least a portion of the cooling time period" (emphasis added), as is recited in Claim 1. Claim 1 further recites that the "cooling time period" is that period during which the single crystal silicon structure is cooled to the second temperature. The failure of Aoyama to disclose this element is discussed above.

The prior art can be modified or combined to reject claims as *prima facie* obvious only if there is a reasonable expectation of success (see MPEP 2143.02). Prior to the present invention, a skilled artisan would not have expected that modifying Aoyama to continue the growth step during cooling would yield successful results because dynamic temperature fluctuations during cooling could detrimentally affect film uniformity and thickness. See Paragraph 9 of the Rule 132 Declaration. Benefits associated with reducing the amount of deposition during the cooling period are also disclosed in the originally-filed specification at, for example, paragraphs **[0116]** and **[0117]**.

Therefore, based on the foregoing, Applicants submit that Claims 7, 8, 14, 21–24 and 30 are allowable over Aoyama, and respectfully request that these rejections be withdrawn.

Claim Rejections Under 35 U.S.C. § 103(a) based on Chu.

Claims 7, 8, 14, 21–24 and 30 stand rejected as unpatentable over Chu. To establish a *prima facie* case of obviousness, all the claim elements must be taught or suggested by the prior art (see MPEP 2143.03). Applicants respectfully submit that the Examiner has failed to meet this burden because, for example, Chu does not disclose "contacting the single crystal Si structure with a surface active compound during at least a portion of the cooling time period", as discussed above.

The prior art can be modified or combined to reject claims as *prima facie* obvious only if there is a reasonable expectation of success (see MPEP 2143.02). Prior to the present invention, a skilled artisan would not have expected that modifying Aoyama to continue the growth step during cooling would yield successful results because dynamic temperature fluctuations during cooling could detrimentally affect film uniformity and thickness. See Paragraph 9 of the Rule 132 Declaration. Benefits associated with reducing the amount of deposition during the cooling period are also disclosed in the originally-filed specification at, for example, paragraphs **[0116]** and **[0117]**.

Therefore, based on the foregoing, Applicants submit that Claims 7, 8, 14, 21–24 and 30 are allowable over Chu, and respectfully request that these rejections be withdrawn.

Application Number **10/800,390**
Amendment dated **24 March 2006**
Reply to Office Action of **24 January 2006**

Conclusion.

In view of the foregoing amendments, the Applicants submit that this application is in condition for allowance, and respectfully request the same. If, however, some issue remains that the Examiner feels can be addressed by an Examiner's Amendment, the Examiner is cordially invited to call the undersigned for authorization.

Respectfully submitted,

KNOBBE MARTENS OLSON & BEAR LLP

Dated: 24 mar 06

By: Kyle P. Schlueter

Kyle P. Schlueter
Registration No. 54,912
Attorney of Record
Customer No. 20,995
(310) 551-3450

2425491
030706